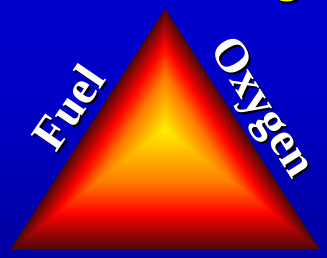
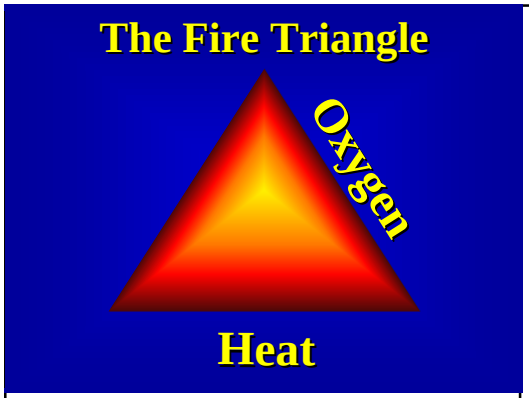
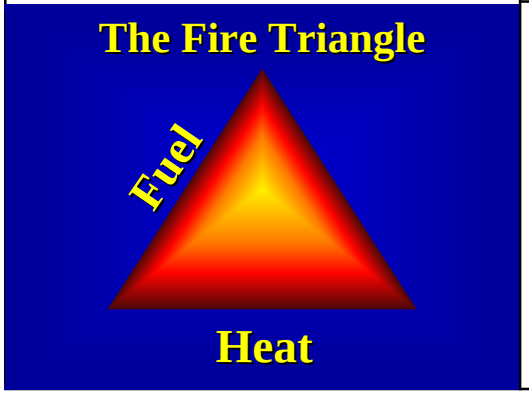
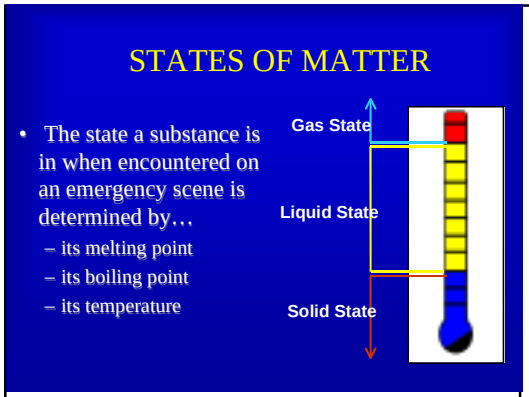
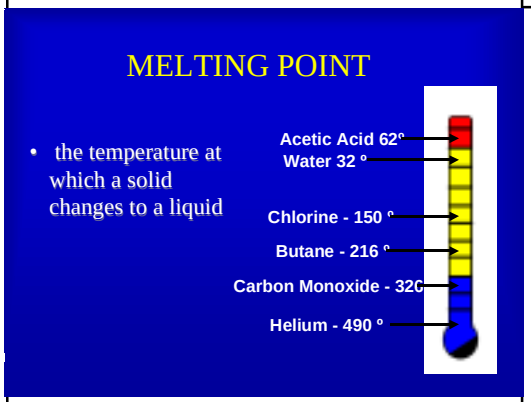
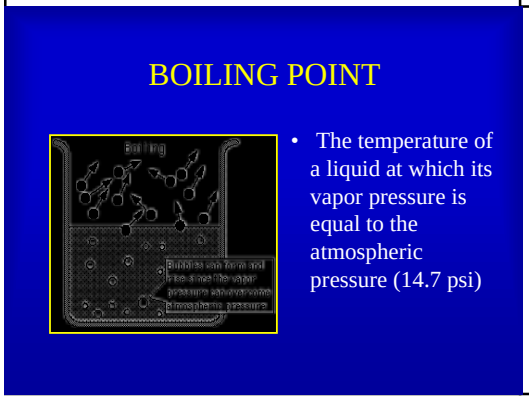
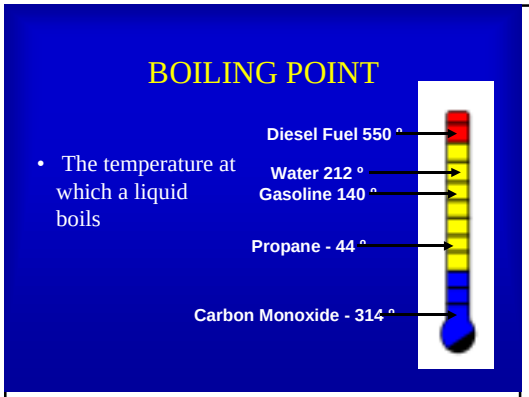
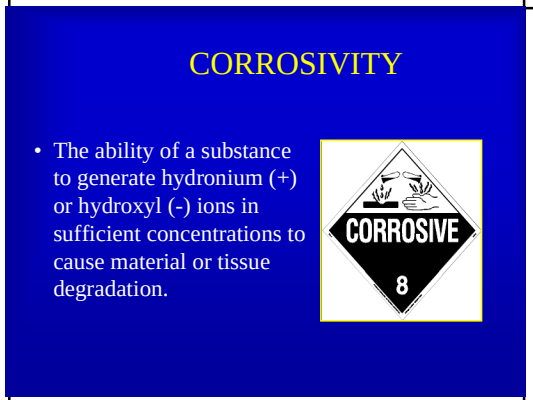
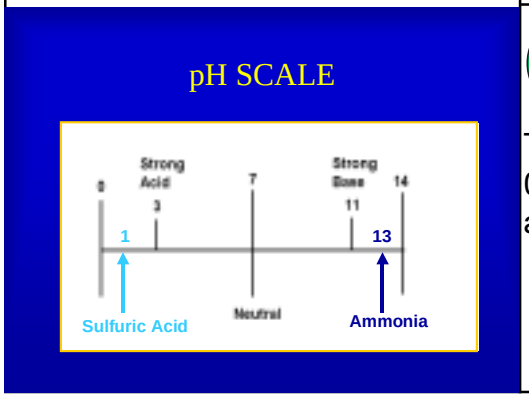
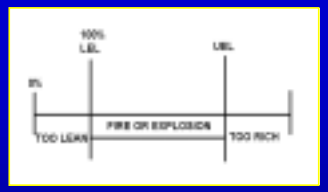
Slides	Primary Course Information	Instructor Activity/Information
Section Two Estimating Likely Harm Without Intervention	This section is one that can make or break the class. You are encouraged to develop SAFE classroom demonstrations that demonstrate the points that go with this section. Examples are: Vegitable oil and water - specific gravity Food coloring and water - contamination Salt or sugar and water - miscibility Ice - melting point Water and heat - Boiling point Diesel fuel and heat - Flash point/ignition temperature HTH and brake fluid (outdoors only) - Reactivity/Violent reaction Pentane and flame Latex and brake fluid or gasoline - chemical breakdown of a material. These must be done with safety in mind and well rehearsed. Do not attempt these without prior	
Terminology and Chemistry	practice. This will avoid embarassment and injury.	
The Fire Triangle  		The fire triangle is a simple fire chemistry concept.

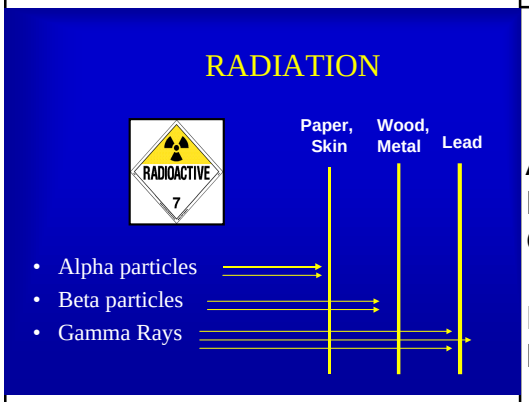
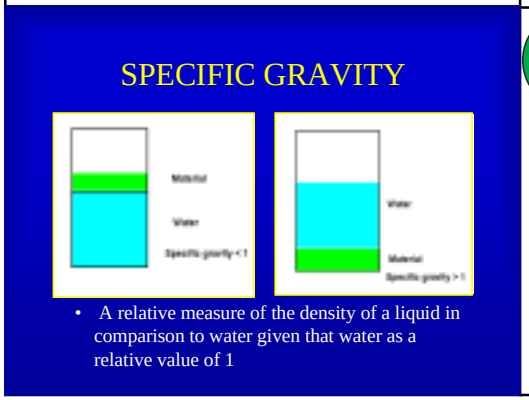
Slides	Primary Course Information	Instructor Activity/Information
	Animated Slide	
	Animated Slide	
	Animated Slide	

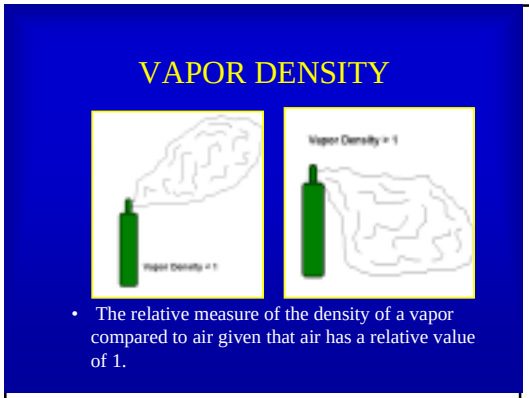
Slides	Primary Course Information	Instructor Activity/Information
	Definition is on the test	
	Definition is on the test	
	Definition is on the test	

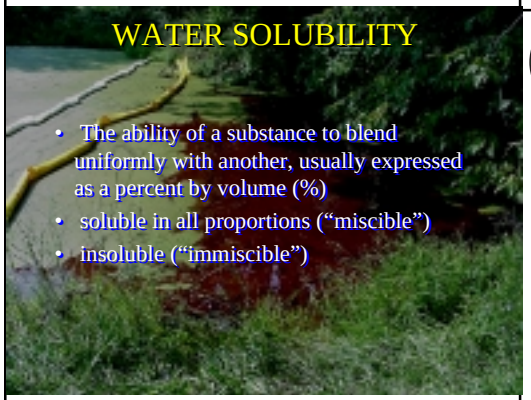
Slides	Primary Course Information	Instructor Activity/Information
	Definition is on the test	
	Definition is on the test	A simpler definition that might be on the test is a chemical's ability to degrade aluminum, wood, or human tissue.
	Definition is on the test The pH scale is a **relative** scale ranging from 0 to 13 that describes the acidity (acid) or alkalynity (base) of a material.	Water is usually neutral @ a pH of 7. The chemicals on the chart provide an idea of the difference.

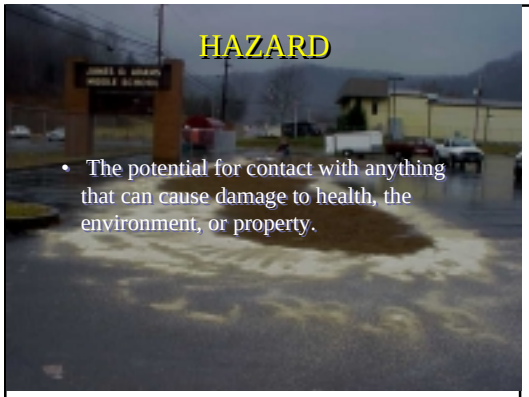
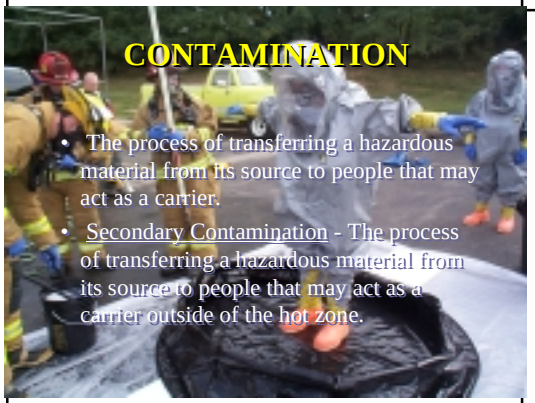
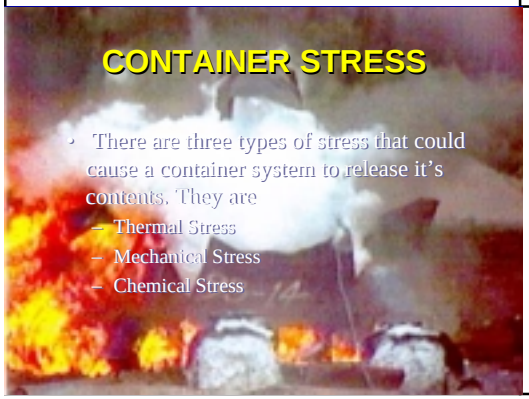
Slides	Primary Course Information	Instructor Activity/Information
FLAMMABLE RANGE  • In order for a gas or vapor to burn, the correct mixture of fuel and oxygen must be present.	Definition will be on the test for flammable range, lower explosive limit (LEL) and upper explosive limit (UEL). **Flammable range** - difference between the lowest concentration (Lower Explosive Limit or LEL) and highest concentration (Upper Explosive Limit or UEL) at which a substance will burn. **Lower Explosive Limit** - lowest concentration of a substance in the air, expressed as a percentage, at which that substance will burn. **Upper Explosive Limit** - highest concentration of a substance in the air, also expressed as a percentage, at which that substance will burn.	
FLAMMABLE LIMITS Fuels / Lower Limit LEL / Upper Limit UEL Acetone 2.5% 15% Acetylene 2.5% 100% Anhydrous Ammonia 16% 25% Butane 1.6% 8.5% Gasoline 1.5% 7.6% Hydrogen 4.0% 75.0% JP-4 1.3% 8.0% Methane 5.0% 15.0% Propane 2.1% 9.5%		
FLASHPOINT • The minimum temperature at which a liquid gives off flammable vapors just above its surface to form an ignitable mixture with air. 	Definition will be on the test for flashpoint **Flashpoint** - the temperature that vapors will burn in a flash when ignited by an outside source, and then go out.	

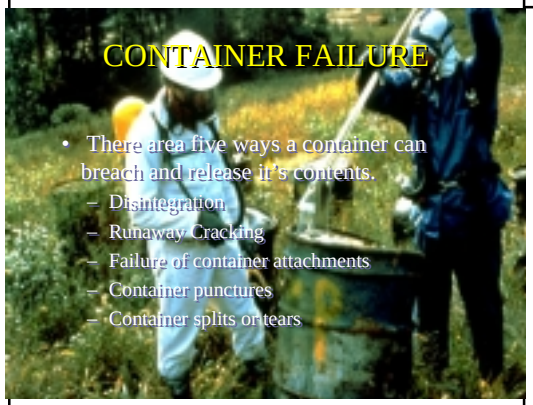
Slides	Primary Course Information	Instructor Activity/Information
IGNITION TEMPERATURE Fuels / Flashpoint / Ignition Temperature Gasoline - 45F 536F to 700F JP-4 30 F 468F Kerosene 100F 444F Cleaning Solvents 100F 450F Paper 250F to 300F Appx. 475F Wood 350F to 400F Appx. 750F • The minimum temperature to which a substance must be raised in order to ignite.	Definition is on the test	
	Definition is on the test	
		This is an LP Gas car in Kingman Arizona. The slide to follow is the BLEVE that resulted. Notice the flow of liquid shooting out of the housing on the top of the car.

Slides	Primary Course Information	Instructor Activity/Information
		This shot is from about 3 miles away
	Definition is on the test Alpha - Particle - Blocked by paper Beta - Particle - blocked by 2-3 layers of al. foil Gamma - Pure energy - lead sheild Immediate effects - radiation burns Delayed effects - cancer, radiation sickness II	
	Definition is on the test	

Slides	Primary Course Information	Instructor Activity/Information
	Definition is on the test	
	The smoke is less than one	
	Chlorine has a vapor density of 2.47	

Slides	Primary Course Information	Instructor Activity/Information
VAPOR PRESSURE Liquid / Vapor Pressure Sulfuric Acid — 0.001 mmHg Kerosene — 5 mmHg Diesel Fuel — 8 mmHg Dihydrogen monoxide — 15 mmHg MEK — 78 mmHg Gasoline — 300 mmHg Pentane — 420 mmHg • The pressure exerted by a vapor at a given temperature, usually expressed in millimeters of mercury (mmHg) at a specific temperature.	Definition is on the test	
 WATER SOLUBILITY • The ability of a substance to blend uniformly with another, usually expressed as a percent by volume (%) • soluble in all proportions (“miscible”) • insoluble (“immiscible”)	Definition is on the test	
 EXPOSURE • The process by which people, animals, the environment or property are subjected to or come in contact with a hazardous material.	Definition is on the test	

Slides	Primary Course Information	Instructor Activity/Information
	Definition is on the test	
	Definition is on the test	
	Definition is on the test	The picture in the background is actually a BLEVE of a household (250 gallon) LP tank. The white is LP liquid. The front of the tank id the rectangle in the center of the screen.

Slides	Primary Course Information	Instructor Activity/Information
		The pictures represent the various forms of container stress. Upper left - Kingman Arizona BLEVE Upper right - Rust on tanks/weathering Lower right - the aftermath of a BLEVE that made the tank fail. This section is about 3/4 mile from the other half.
		
Container Failure **There are five ways a container can breach and release its contents.** **They are:** **- Disintegration** **- Runaway cracking** **- Failure of container attachments** **- Container punctures** **- Container splits or tears**		

Slides	Primary Course Information	Instructor Activity/Information
Container Contents Released **The four types of releases include:** **- Detonation** **- Violent rupture** **- Rapid relief** **- Spills or leaks**		It may be helpful to compare this to the failure of a tire on a car. Detonation - tire packed with explosives explodes. Violent rupture = blow out Rapid relief = knife to the tire Spills or leaks = small leak
Chapter Five - Hazard Identification	A large portion of this section is introducing and familiarizing students with the various reference materials. You must be familiar with the reference books. There are 3 main books in addition to the ERG that students should be able to use. The Fire Protection Guide to Hazardous Materials The NIOSH Pocket Guide to Chemical Hazards Emergency Handling of Hazardous Materials in Surface Transportation This section of the course is not supported by slides. First review the requirements of CHEMTREC and then break down the different section of each book and the proper uses of each book.	
CHEMTREC   **1-800-424-9300**		

Slides	Primary Course Information	Instructor Activity/Information
Information Needed by CHEMTREC • Your name, call back telephone, FAX number • Location and nature of problem • Name and identification number of material(s) • Shipper/consignee/point of origin • Carrier name, rail car or truck number		
• Container type and size • Quantity of material transported/released • Local conditions (weather, etc.) • Injuries and exposures • Local emergency services that have been called		
National Response Center **1-800-424-8802** **202-267-2675 in the District of Columbia**	Reference Manuals	

Slides	Primary Course Information	Instructor Activity/Information
Chapter Six - Estimating Potential Harm		
Chapter 6 Scenarios Classroom Applications	The purpose of this is to allow students the opportunity to problem solve by applying the information thay have been given to this point. The students have two questions to answer: 1) Are there any hazardous materials present? 2) What happens if nothing is done? Do not allow the students to go any further than this: ie development of response objectives, how to control the flow etc. Divide the students into small groups of 3-5 people and give them the scenerios.	

Slides	Primary Course Information	Instructor Activity/Information
Scenario #1 • You have been dispatched to a local rail yard. • People are complaining of burning eyes and a acrid odor. • It is 12:30 pm • Temperature is 85° and humidity is 65%	This is consistant with many of the dispatches with what responders will receive.	
	This is what responders see as they approach from an uphill, upwind direction. If they ask for dispatch to obtain further information, you may advance to the next slide. Students should be able to figure a way to get closer once they see there is not a visible cloud.	
	Hazardous Materials are present. Letting this situation go will result in further exposure of the public and railyard workers. Although it is not a major leak, it needs attention.	

Slides	Primary Course Information	Instructor Activity/Information
Scenario #2 • You are called to stop a truck that is leaking a fine mist. • The truck is a flatbed with three large round silver colored drums on it. • Kegs have id number 978.	This is consistant with many of the dispatches with what responders will receive.	
		
	Hazardous Materials are present. Letting this situation go will result in further exposure of the public and railyard workers. Although it is not a major leak, it needs attention.	

Slides	Primary Course Information	Instructor Activity/Information
	Hazardous Materials are present. However, the Uranium Hexaflouride is in a white crystalline form, not a liquid form. Therefore, the uranium hexaflouride is probably not leaking. This takes further information before an informed decision can be made.	
Scenario #3 • You are called to a local factory for a strange odor and a gas cloud. • The company has not filed a response plan since 1994. • The local EM director is out of town and the local emergency operations plan is not available at this time.		
		

Slides	Primary Course Information	Instructor Activity/Information
		
	Hazardous Materials are present. This is a gas that is allowed to vent. There is no danger to the public - no need for action.	
Scenario #4 • You are answering a call at the local rail yard of a leaking tank car. • The caller says that the car is blue and leaking a clear substance.		

Slides	Primary Course Information	Instructor Activity/Information
	Hazardous Materials are not present. This is an un-placarded potable (drinkable) water tank and requires no further action.	